INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER QUALITY
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NONRULE POLICY DOCUMENT

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Title:	**Development of Alternate Acute Mixing Zones for Discharges to Waters Outside the Great Lakes System**
Identification Number:	
Date Originally Adopted:	
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Other Policies Repealed or Amended:	**None**
Brief Description of Subject Matter:	**Procedure for Developing Alternate Mixing Zones for Acute Aquatic Criteria for Discharges to Waters Outside the Great Lakes System**
Citations Affected:	**327 IAC 2-1-6(a)(1)(D)(i), 327 IAC 2-1-9(12) and 327 IAC 5-2-11.1(b)(1)**

This nonrule policy document is intended solely as guidance and does not have the effect of a law nor does it represent formal Indiana Department of Environmental Management (IDEM) final action. This nonrule policy document shall be used in conjunction with the applicable laws, and if this policy conflicts with the laws, the laws shall supercede this policy. A revision to this nonrule policy document may be put into effect by IDEM once the revised nonrule policy document is made available for public inspection and photocopying. IDEM will submit any revisions to this nonrule policy to the Indiana Register for publication.

The rules applicable to discharges to waters outside the Great Lakes system make provision for alternate acute mixing zones. However, the rules are not clear on the specific requirements for receiving an alternate acute mixing zone. The purpose of this nonrule policy document is to provide definitions for key terms that are not currently defined in the rules, to provide the guidelines that IDEM will use in determining whether to allow an alternate acute mixing zone and to provide the application requirements for an alternate acute mixing zone.

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A. Applicability

This nonrule policy document is only applicable to discharges to receiving streams outside the Great Lakes system. Mixing zones for aquatic life criteria are not allowed for discharges to lakes (327 IAC 2-1-4(e)) so this nonrule policy document is not applicable to discharges to lakes. This nonrule policy document is only applicable to those pollutants in a discharge that have acute aquatic life criteria and to acute whole effluent toxicity.

B. Purpose

The Indiana Administrative Code contains the following rules, applicable to discharges to waters outside the Great Lakes system, that make provision for mixing zones for acute aquatic criteria:

327 IAC 2-1-6(a)(1)(D)(i)

"to assure protection of aquatic life, concentrations of toxic substances shall not exceed the final acute value (FAV = 2 (AAC)) in the undiluted discharge or the acute aquatic criterion (AAC) outside the zone of initial dilution or, if applicable, the zone of discharge-induced mixing:"

327 IAC 2-1-9(12)

"'Discharge-induced mixing' or 'DIM' means mixing initiated by the use of submerged, high rate diffuser outfall structures which provide turbulent initial mixing and will minimize organism exposure time."

327 IAC 5-2-11.1(b)(1)

"The final acute value (FAV = 2 (AAC)) will be applied directly to the undiluted discharge, or, if dilution by discharge induced mixing is allowed, the AAC will be applied outside the discharge induced mixing zone."

According to the above rules, for a discharger to receive a wasteload allocation based on an acute aquatic criterion that is greater than the FAV, they must utilize a submerged, high rate diffuser that provides turbulent initial mixing and minimizes organism exposure time. If dilution by discharge-induced mixing is allowed, the wasteload allocation for the acute aquatic criterion will be calculated by applying the AAC outside the discharge-induced mixing zone.

The Indiana Code contains the following statute, added after the promulgation of 327 IAC 2-1-9(12), that expands the applicability of discharge-induced mixing to outfall structures that are the functional equivalent of submerged high rate diffusers:

IC 13-18-4-8

"In issuing permits authorizing discharge induced mixing, the commissioner shall allow for mixing initiated by the use of:

(1) submerged, high rate diffuser outfall structures; or

(2) the functional equivalent of submerged, high rate diffuser outfall structures;

that provide turbulent initial mixing and minimize organism exposure times."

To implement the above rules and statute, IDEM must address the following questions:

(1) What is the definition of the term "discharged-induced mixing zone"?
(2) What is the definition of the term "high rate diffuser"?
(3) When will dilution by discharge-induced mixing be allowed?

This nonrule policy document defines the terms "discharge-induced mixing zone" and "high rate diffuser" and provides the guidelines IDEM will use to determine whether to allow dilution by discharge-induced mixing. Acute mixing zones that result from discharge-induced mixing are referred to as "alternate acute mixing zones" in this nonrule policy document. The term "high rate diffuser" is defined in a manner that incorporates the "functional equivalent" portion of the state statute. This nonrule policy document also provides application requirements for dischargers requesting alternate acute mixing zones and dischargers that currently have approved alternate acute mixing zones.

C. Definitions

"Discharge-induced mixing zone"

"Discharge-induced mixing zone" or "DIMZ" means the area in a receiving waterbody contiguous to a submerged, high rate diffuser where the mixing of the discharge with the receiving water is controlled by the initial flux of the momentum and buoyancy of the discharge."

"High rate diffuser"

"High rate diffuser" means an outfall structure consisting of a single port or multiple ports that provides turbulent initial mixing of a discharge with a receiving water and will minimize organism exposure time. The discharge velocity from each port of the outfall structure must be greater than the natural velocity of the waterbody in the vicinity of the port during the critical flow condition of the waterbody.

D. Guidelines for Allowing Alternate Acute Mixing Zones

IDEM will allow alternate acute mixing zones for discharges to receiving streams on a pollutant-by-pollutant basis under the following conditions:

(1) The receiving stream has assimilative capacity for the pollutant.
(2) The discharger will utilize a submerged, high rate diffuser outfall structure (a diffuser) that provides turbulent initial mixing and minimizes organism exposure time.
(3) The alternate acute mixing zone will not exceed the discharge-induced mixing zone.
(4) The alternate acute mixing zone and actual chronic mixing zone will not have an adverse effect on aquatic life.
(5) The alternate acute mixing zone and actual chronic mixing zone will not otherwise impair or interfere with the designated or existing uses of the receiving stream or downstream waters.

The current IDEM chronic mixing zone policy does not require the delineation of a chronic mixing zone in the receiving stream. Instead, a default mixing zone dilution of fifty percent of the Q7,10 flow of the receiving stream may be used in calculating wasteload allocations for chronic aquatic criteria for pollutants regardless of the chronic mixing zone that results in the receiving stream. The chronic mixing zone policy assumes that the water quality-based effluent limits (WQBELs) for discharges to receiving streams with high dilution will be based on the acute aquatic criterion. For most pollutants, if the WQBELs are based on the acute aquatic criterion, the permitted discharge of the pollutant will be much less than would be allowed if the WQBELs were based on the chronic aquatic criterion. In these cases the actual chronic mixing zone will be much smaller than the chronic mixing zone that would result if the WQBELs were based on the chronic aquatic criterion and calculated using the default mixing zone dilution. If an alternate acute mixing zone is allowed, the size of the actual chronic mixing zone will increase beyond that anticipated by the chronic mixing zone policy. Therefore, IDEM will also take into consideration the increase in the size of the actual chronic mixing zone in determining whether to allow an alternate acute mixing zone.

In determining whether a mixing zone proposed by a discharger will have an adverse effect on aquatic life or will otherwise impair or interfere with the designated or existing uses of the receiving stream or downstream waters, IDEM will give particular attention to the size and location of the mixing zone in the receiving stream. Alternate acute mixing zones shall be sized to prevent lethality to organisms. This includes drifting and free-swimming organisms that may pass through the mixing zone and organisms that may be attracted to the mixing zone or for other reasons temporarily reside within the mixing zone. The size of actual chronic mixing zones shall be protective of the ecology of the receiving stream as a whole. In choosing the location of alternate acute and actual chronic mixing zones, the discharger must ensure that these mixing zones avoid critical habitat, ecologically important benthic organisms that currently reside in the receiving stream and public water supply and agricultural water supply intakes.

IDEM will allow alternate acute mixing zones to be sized to the extent that discharge-induced mixing occurs unless IDEM determines that allowing such a mixing zone will have an adverse effect on aquatic life or will otherwise impair or interfere with the designated or existing uses of the receiving stream or downstream waters. In these cases IDEM will size the alternate acute mixing zone to the extent that it does not impair or interfere with the designated and existing uses of the receiving stream and downstream waters. IDEM will use best professional judgment, taking into consideration available information about the discharge and receiving stream, in determining whether a mixing zone will have an adverse effect on aquatic life or will otherwise impair or interfere with the designated or existing uses of the receiving stream or downstream waters. The specific adverse effects to aquatic life that IDEM will consider as reasons to not allow an alternate acute mixing zone include, but are not limited to the following:

(1) The discharge would be lethal to drifting or free-swimming organisms that may pass through the alternate acute mixing zone. This includes toxic effects from the concentrations of pollutants in the discharge as well as lethality from the force of the discharge itself.
(2) The discharge would be lethal to organisms that may be attracted to the alternate acute mixing zone (e.g. as a result of temperature effects) or for other reasons may temporarily reside within the alternate acute mixing zone (e.g. the alternate acute mixing zone extends into feeding or breeding areas or other critical habitat).
(3) The alternate acute mixing zone or actual chronic mixing zone would jeopardize the continued existence of any threatened or endangered species or would result in the destruction or adverse modification of such species' critical habitat.
(4) The alternate acute mixing zone or actual chronic mixing zone would overlap an ecologically important spawning or nursery area of an indigenous aquatic species or other critical or unique habitat (e.g. feeding areas, the mouths of tributaries, shallows or shoreline habitat).
(5) The alternate acute or actual chronic mixing zone would interfere with or block passage of aquatic life (e.g. the alternate acute or actual chronic mixing zone would obstruct the migratory route of an indigenous aquatic species or prevent or otherwise interfere with the passage of aquatic life into a tributary).
(6) The alternate acute mixing zone or actual chronic mixing zone would overlap ecologically important benthic organisms that currently reside in the receiving stream.

If another outfall from the same facility or an outfall from a nearby facility is present, IDEM will take into consideration the synergistic effects of overlapping mixing zones and the aggregate effects of adjacent mixing zones in determining whether a mixing zone will have an adverse effect on aquatic life or otherwise impair or interfere with the designated or existing uses of the receiving stream or downstream waters. In addition to adverse effects to aquatic life, other factors that IDEM will consider as impairing or interfering with the designated or existing uses of the receiving stream or downstream waters include, but are not limited to, a mixing zone overlapping a public water supply or agricultural water supply intake or a mixing zone impairing or interfering with a recreational use of the receiving stream or downstream waters.

E. Application Requirements and Documentation of IDEM Determination

The information required in an application for an alternate acute mixing zone will depend on the type of request and the amount of information about the receiving stream and discharge that is currently available to IDEM. Therefore, the applicant should contact IDEM early in the application process to discuss the requirements for their application. Requests for alternate acute mixing zones should be sent to the permit manager in the Office of Water Quality Permits Branch who has been assigned to the facility. The following is a list of the types of requests expected and the application requirements:

(1) A new discharger or an existing discharger that does not currently have an approved alternate acute mixing zone is requesting an alternate acute mixing zone for one or more pollutants.

Application Requirement: The applicant must submit a written request that contains the information in Section F., Parts I through VII.

(2) A discharger that currently has an approved alternate acute mixing zone for one or more pollutants is requesting that the approved mixing zone be allowed in the renewal permit.

Application Requirement: As part of their application for permit renewal, the applicant must document whether any of the information required under Section F., Parts I through VII has changed since the alternate acute mixing zone was last approved and submit any updated information.

(3) A discharger that currently has an approved alternate acute mixing zone for one or more pollutants is requesting one of the following as part of a permit modification or the renewal of their NPDES permit:

(A) An alternate acute mixing zone based on a revised discharge flow.
(B) To modify their existing outfall structure.
(C) An alternate acute mixing zone for one or more additional pollutants.

Application Requirement: As part of their application for a permit modification or permit renewal, the applicant must document whether any of the information required under Section F., Parts I through VII will change as a result of the proposed action or has changed since the alternate acute mixing zone was last approved and submit any updated information.

Once a complete application is received, IDEM will make a determination on the request for an alternate acute mixing zone using the guidelines in Section D. If IDEM allows an alternate acute mixing zone for a pollutant or whole effluent toxicity, the location of the alternate acute mixing zone and the dilution factor, as determined for the critical stream flow condition, will be documented in the Fact Sheet of the applicant's NPDES permit. IDEM will use the dilution factor in the calculation of WQBELs for the pollutant or in the case of whole effluent toxicity, the determination of permit requirements for whole effluent toxicity.

F. Information Required for Alternate Acute Mixing Zone Demonstrations

The information specified in Parts I through VII, below, is required for IDEM to make a determination on a request for an alternate acute mixing zone. On a case-by-case basis, IDEM may request information in addition to that specified in Parts I through VII. For a discharger that currently has an approved alternate acute mixing zone, IDEM may already have most of the required information. For some receiving streams, IDEM may already have collected some of the information specified in Parts I and VI. IDEM may also be able to provide some assistance to the applicant for Parts III, IV, V and VII. If IDEM does not have any of the required information, then the applicant will be required to provide the information. Therefore, as previously stated, it is recommended that the applicant contact IDEM early in the application process.

Part I. Documentation of the Assimilative Capacity of the Pollutant of Concern

The information listed below is required for IDEM to determine the assimilative capacity of the receiving stream for the pollutant of concern. The amount of data required by IDEM will be determined on a case-by-case basis, but should generally cover a time period of at least one year.

(1) Ambient data for the pollutant upstream of the outfall.
(2) If the aquatic criteria of the pollutant are dependent on pH, temperature or hardness, ambient data for these parameters, as applicable, downstream of the proposed acute and chronic mixing zones.

Part II. Documentation of the Proposed Discharge and Diffuser

IDEM prefers that the diffuser be designed to achieve an exit velocity of at least 3 m/s from each port during average discharge flow conditions. IDEM will consider other designs on a case-by-case basis if it is not feasible or desirable to design a diffuser to meet this requirement. In these cases the exit velocity from each port should still be maximized to the extent possible.

(1) Include a design diagram of the diffuser.
(2) Include a map (preferably, a USGS topographical map) showing the location of the proposed diffuser and any nearby outfall structures in the receiving stream.
(3) Include diagrams showing the estimated velocity and depth of the receiving stream during Q1,10 and Q7,10 conditions along the cross section where the diffuser will be located. Show the location of the diffuser along the cross section.
(4) Document whether the discharge will be intermittent or continuous.
(5) Document the proposed daily minimum, daily average and daily maximum flows through the diffuser and the resulting exit velocities from the diffuser.
(6) Document the expected effluent concentration of the pollutant. In some cases, IDEM may require that the applicant submit the results of whole effluent toxicity tests.
(7) Document the expected range of effluent temperature and density.

Part III. Documentation of the Discharge Induced Mixing Zone and Dilution Factor

The applicant must use a mixing zone model to estimate the size, shape and location of the discharge-induced mixing zone and the corresponding dilution and in some cases may be required to conduct an instream study. The dilution given by mixing zone models will be referred to as the "dilution factor" in this nonrule policy document. In order to document the discharge-induced mixing zone and the actual chronic mixing zone, a mixing zone model must be chosen that is capable of modeling both near-field and far-field mixing processes. The mixing zone model that IDEM prefers is CORMIX. This model is applicable to most discharge situations encountered in Indiana. CORMIX assigns a flow classification to the discharge situation and divides the mixing processes into near-field and far-field regions. The near-field region in CORMIX is analogous to the discharge-induced mixing zone. The CORMIX software also includes a tool that gives a three-dimensional view of the mixing zone. Therefore, CORMIX can be used to estimate the size, shape and location of the discharge-induced mixing zone and the dilution factor. Other mixing zone models will be considered on a case-by-case basis. The ambient and discharge parameters used in the model must be documented. Some of the ambient parameters, such as the velocity and depth, will require site-specific data. The following guidelines shall be used in choosing the model parameters:

(1) Only the portion of the receiving stream in the vicinity of the discharge-induced mixing zone should be modeled. Therefore, the average velocity and depth of the receiving stream used in the model should be those that will occur in the vicinity of the discharge-induced mixing zone during critical stream flow conditions. The Q1,10 is the critical stream flow that should be used for acute aquatic life criteria.
(2) The mixing zone model will require either the density or temperature of the discharge and the receiving stream. The values used should be based on those expected during Q1,10 conditions in the receiving stream and result in a conservative estimate of the dilution factor.
(3) The discharge flow used in the model shall be the same flow used to calculate water quality-based effluent limitations.

A sensitivity analysis must be done to account for any uncertainty in the ambient and discharge parameters. This will result in a range of discharge-induced mixing zones and dilution factors. The applicant should select a conservative estimate of the discharge-induced mixing zone and dilution factor for consideration by IDEM.

The dilution factor given by mixing zone models may be the centerline dilution or the average dilution. IDEM will use the centerline dilution in the calculation of WQBELs unless the mixing zone model determines the dilution using a uniform concentration profile (e.g. some modules in CORMIX such as the control volume and buoyant spreading modules and the module for the acceleration zone of a unidirectional co-flowing diffuser use a uniform concentration profile). On a case-by-case basis, the average dilution may be used instead of the centerline dilution if IDEM determines that using the average dilution will not have an adverse effect on aquatic life. In making this determination, IDEM will give particular attention to factors that include, but are not limited to, the size of the alternate acute mixing zone, the aquatic life that may come into contact with the alternate acute mixing zone and the toxicity of the discharge.

If an alternate acute mixing zone is approved by IDEM, its size may be equivalent to the discharge-induced mixing zone, as modeled, or its size may be a smaller area determined not to cause adverse effects to aquatic life. Once the location of the alternate acute mixing zone is established and the diffuser is in place, the dilution factor estimated through modeling can be verified or adjusted through an instream study. This study should be conducted as close to critical stream flow conditions as possible using a conservative tracer such as Rhodamine dye. On a case-by-case basis, IDEM may require that the applicant conduct an instream study. In making this determination, IDEM will give particular attention to factors that include, but are not limited to, the size of the alternate acute mixing zone and dilution factor, the amount of uncertainty in the results of the mixing zone model and the potential for adverse effects to aquatic life. The applicant may also initiate an instream study and request that IDEM use the information, in conjunction with the model, to determine the dilution factor. The applicant should submit the plan for the study to IDEM for approval prior to conducting the study.

Part IV. Documentation of the Actual Chronic Mixing Zone

After estimating the size, shape and location of the discharge-induced mixing zone and the dilution factor, the size, shape and location of the actual chronic mixing zone must be estimated. The first step in this process is to calculate the dilution factor required to meet the chronic water quality criterion. A mixing zone model is then used to estimate the location in the receiving stream where the chronic dilution factor is achieved (i.e. the location of the actual chronic mixing zone). The procedure for calculating the chronic dilution factor is included in Part V. In estimating the location in the receiving stream where the chronic dilution factor is achieved, the chronic dilution factor should be compared to the centerline dilution given by the mixing zone model or the average dilution if the mixing zone model determines the dilution using a uniform concentration profile. The mixing zone model used to document the discharge-induced mixing zone should be used to document the actual chronic mixing zone. The following guidelines shall be used in choosing the model parameters:

(1) Only the portion of the receiving stream in the vicinity of the actual chronic mixing zone should be modeled. Therefore, the average velocity and depth of the receiving stream used in the model should be those that will occur in the vicinity of the actual chronic mixing zone during critical stream flow conditions. The Q7,10 is the critical stream flow that should be used for chronic aquatic life criteria.
(2) The mixing zone model will require either the density or temperature of the discharge and the receiving stream. The values used should be based on those expected during Q7,10 conditions and result in a conservative estimate of the actual chronic mixing zone.
(3) The effluent flow used in the model shall be the flow used to calculate water quality-based effluent limitations.

A sensitivity analysis must be done to account for any uncertainty in the ambient and discharge parameters. This will result in a range of actual chronic mixing zones that must be evaluated. Once the diffuser is in place, IDEM may require the applicant to conduct an instream study to verify the location of the actual chronic mixing zone if there is concern that the actual chronic mixing zone will have an adverse effect on aquatic life or will otherwise impair or interfere with the designated or existing uses of the receiving stream or downstream waters.

Part V. Calculation of the Chronic Dilution Factor

The calculation of the chronic dilution factor will not be required for whole effluent toxicity. For pollutants, the chronic dilution factor shall be calculated as follows:

(1) Use the dilution factor for the discharge-induced mixing zone to calculate the acute wasteload allocation (WLA).
(2) Calculate the default chronic wasteload allocation using one-half of the Q7,10 for dilution.
(3) Translate the acute wasteload allocation and the default chronic wasteload allocation into long-term averages (LTAs).
(4) Back calculate the chronic wasteload allocation from the lowest long-term average.
(5) Back calculate the chronic dilution factor from the chronic wasteload allocation.

The above steps assume that the WQBELs will be based on either the acute or chronic aquatic life criterion. The equations for each step of the calculation are included below:

(1) Calculation of Acute Wasteload Allocation

$WLA_a = [WQC_a * (Q_e + Q_w) - (Q_w * C_b)]/Q_e$

The following is a simplified equation using the dilution factor:

$WLA_a = (WQC_a * DF) - (C_b * (DF - 1))$

(2) Calculation of Default Chronic Wasteload Allocation

Default $WLA_c = [WQC_c * (Q_e + Q_w) - (Q_w * C_b)]/Q_e$

(3) Calculation of Acute and Chronic Long-Term Averages

$LTA_a = [e^{(0.5 * F^2 - 2.326 * F)}] * WLA_a$

$LTA_c = [e^{(0.5 * F_4^2 - 2.326 * F_4)}] * \text{Default } WLA_c$

Where: $F^2 = \ln(CV^2 + 1)$

$F_4^2 = \ln(CV^2/4 + 1)$

CV = coefficient of variation = ratio of the standard deviation to the mean. If effluent data are not available to calculate the CV, a value of six-tenths (0.6) shall be used.

(4) Calculation of Chronic Wasteload Allocation

$WLA_c = [Min(LTA_a, LTA_c)]/[e^{(0.5 * F_4^2 - 2.326 * F_4)}]$

(5) Calculation of Chronic Dilution Factor

Chronic $DF = (WLA_c - C_b)/(WQC_c - C_b)$

The following apply to the above calculations:

(A) WQC_a = The acute aquatic criterion (AAC).
(B) WQC_c = The chronic aquatic criterion (CAC).
(C) Q_e = The facility discharge flow.
(D) Q_w = The portion of the receiving stream flow allocated for mixing. For a default chronic wasteload allocation for a pollutant, Q_w is equal to 50% of the Q7,10. For an alternate acute mixing zone, Q_w is the flow of receiving water entrained in the discharge plume as a result of discharge-induced mixing and is represented by the following equation: $Q_w = (DF - 1) * Q_e$.
(E) C_b = The ambient concentration of the pollutant of concern.
(F) DF = The dilution factor obtained from the mixing zone model. The dilution factor can be represented by the following equation: $DF = (Q_w + Q_e)/Q_e$.

Part VI. Documentation of the Uses and Characteristics of the Receiving Stream

(1) Document the designated uses of the receiving stream.

(2) Document the critically sensitive species of aquatic life in the receiving stream that may be exposed to the discharge. Particular attention should be given to the following:

(A) Any species that may be especially sensitive to the discharge.
(B) Any migratory species.
(C) Any threatened or endangered species.

If a bioassessment has not been conducted in the receiving stream by IDEM or another source approved by IDEM and transferable data are not available from another similar stream, the applicant may be required to conduct a bioassessment.

(3) Document the physical and biological characteristics of the receiving stream in the vicinity (both upstream and downstream) of the proposed alternate acute and actual chronic mixing zones. Include a diagram showing the location of specific features. Particular attention should be given to the following:

(A) The presence of any spawning or nursery areas of any indigenous aquatic species or any other critical or unique habitat such as feeding areas, shallows or shoreline habitat.
(B) The presence of any spawning or nursery areas or any other critical habitat for any threatened or endangered species.
(C) The morphology of the stream. Include the location and proportion of riffles, runs and pools and whether the stream has been channelized.
(D) The substrate character.
(E) The presence of any dams.
(F) The presence of any tributaries.
(G) The presence of any migratory routes of any indigenous aquatic species.
(H) The presence of any ecologically important benthic organisms such as mussels.

(4) Document the presence of any threatened or endangered species in the receiving stream other than any aquatic species mentioned above.
(5) Document the location of any other outfalls from the same facility or any nearby facilities.
(6) Document the location of any public water supply intakes or industrial or agricultural water supply intakes in the receiving stream.
(7) Document any existing uses of the receiving stream that are not designated uses. This includes any existing recreational uses of the receiving stream.

Part VII. Discussion Questions

After documenting the proposed discharge and outfall structure, the discharge-induced mixing zone, the actual chronic mixing zone and the uses and characteristics of the receiving stream, the applicant must address the following questions:

(1) Would the discharge be lethal to drifting or free-swimming organisms that may pass through the alternate acute mixing zone?
(2) Discuss whether organisms would be attracted to the alternate acute mixing zone as a result of the effluent character. Would the discharge be lethal to organisms that may be attracted to the alternate acute mixing zone or for other reasons may temporarily reside within the alternate acute mixing zone?
(3) Would the alternate acute mixing zone or actual chronic mixing zone jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of such species' critical habitat?
(4) Would the alternate acute mixing zone or actual chronic mixing zone overlap an ecologically important spawning or nursery area of an indigenous aquatic species or other critical or unique habitat?
(5) Would the alternate acute mixing zone or actual chronic mixing zone interfere with or obstruct the passage of aquatic life? This includes obstructing the migratory route of an indigenous aquatic species or preventing or otherwise interfering with the passage of

aquatic life into a tributary.

(6) Would the alternate acute mixing zone or actual chronic mixing zone overlap any ecologically important benthic organisms that currently reside in the receiving stream?

(7) If another outfall from the same facility or an outfall from a nearby facility is present, discuss the synergistic effects of any overlapping mixing zones or the aggregate effects of any adjacent mixing zones.

(8) Would the alternate acute mixing zone or actual chronic mixing zone overlap a public water supply or agricultural water supply intake?

(9) Would the alternate acute mixing zone or actual chronic mixing zone impair or interfere with a recreational use of the receiving stream?

(10) Would the alternate acute mixing zone or actual chronic mixing zone otherwise impair or interfere with the designated or existing uses of the receiving stream or downstream waters?